CLAIMS

What is claimed is:

1. A method for detecting a single nucleotide polymorphism in a target DNA, comprising the steps of:

(a) conducting a primer extension reaction with components including (1) the target DNA, (2) labeled dideoxynucleotides, and (3) an oligonucleotide primer having a sequence hybridizable to the target DNA, so that a 3' end of the oligonucleotide primer terminates at a last nucleotide before a single nucleotide polymorphism, whereby an extended primer is produced including a 3' end having a labeled dideoxynucleotide corresponding to the single nucleotide polymorphism in the target DNA;

(b) hybridizing the extended primer to one or more oligonucleotides immobilized on a solid support in the form of an immobilization pattern, whereby a hybridization pattern is produced; and

(c) detecting the presence or absence of hybridized extended primer in the hybridization pattern.

2. The method of claim 1, wherein said primer extension reaction is a multiplex primer extension reaction.

3. The method of claim 1, further including the step, before step (a), of identifying a single nucleotide polymorphism of interest in the target DNA.

4. The method of claim 3, wherein one or more of said single nucleotide polymorphisms are associated with drug resistance.

5. The method of claim 1, wherein one or more of said single nucleotide polymorphisms are located in genes coding for target enzymes of a drug or for transporters associated with drug influx or efflux.

6. The method of claim 1, wherein said oligonucleotide primer has a length between 20 and 40 base pairs.

7. The method of claim 1, further comprising the steps, before step (a), of: amplifying the target DNA using sequence-specific primers in a polymerase chain reaction, whereby a product is produced comprising the original target DNA and additional target DNA; and treating the additional target DNA with alkaline phosphatase.

8. The method of claim 7, wherein said polymerase chain reaction is a multiplex polymerase chain reaction.

9. The method of claim 7, wherein the polymerase chain reaction is an in situ polymerase chain reaction.

10. The method of claim 1, wherein said target DNA is from a microorganism.

11. The method of claim 10, wherein said microorganism is a pathogen.

12. The method of claim 11, wherein said pathogen is of a taxon Apicomplexa.

13. The method of claim 12, wherein said pathogen is of the genus Plasmodium.

14. The method of claim 13, wherein said pathogen is of the species Plasmodium falciparum.

15. The method of claim 14, wherein said single nucleotide polymorphism is located in a Plasmodium falciparum gene selected from the group consisting of pfmdr-1, pfcrt, pfdhfr, pfdhps, pftctp, and the Cytochrome-B gene.

16. The methods of claim 1, wherein said dideoxynucleotides are fluorochrome labeled.

17. The method of claim 16, wherein said dideoxynucleotides comprise a plurality of species, each species being labeled with a different fluorochrome.

18. The method of claim 17, wherein said detecting step comprises detecting hybridized extended primers with a multi-laser scanner.

19. The method of claim 1, wherein said detecting step includes detecting the presence or absence of at least about 2 single nucleotide polymorphisms of the target DNA.

20. The method of claim 1, wherein said detecting step includes detecting the presence or absence of at least about 10 single nucleotide polymorphisms of the target DNA.

21. The method of claim 1, wherein said detecting step includes detecting the presence or absence of at least about 25 single nucleotide polymorphisms of the target DNA.

22. The method of claim 1, wherein said detecting step includes detecting the presence or absence of at least about 50 single nucleotide polymorphisms of the target DNA.

23. The method of claim 1, wherein said immobilized oligonucleotides are immobilized in a microarray.

24. The method of claim 23, wherein said microarray consists of an aldehyde slide and said immobilized oligonucleotides are bound to the aldehyde slide with a C6 amino linker.

25. The method of claim 1, wherein said detecting step comprises detecting a fluorochomic quality or color of said hybridized extended primer.

26. A method for drug resistance testing in malaria, comprising the steps of:

(a) identifying a single nucleotide polymorphism related to drug resistance in malaria;

(b) conducting a primer extension reaction with components including (1) the target DNA, (2) labeled dideoxynucleotides, and (3) an oligonucleotide primer having a sequence hybridizable to the target DNA, so that a 3' end of the oligonucleotide primer terminates at a last nucleotide before a single nucleotide polymorphism, whereby an extended primer is produced including a 3' end having a labeled dideoxynucleotide corresponding to the single nucleotide polymorphism in the target DNA;

(c) hybridizing the extended primer to one or more oligonucleotides immobilized on a solid support in the form of an immobilization pattern, whereby a hybridization pattern is produced; and

(d) detecting the presence or absence of hybridized extended primer in the hybridization pattern.

27. A method for diagnostic or pharmacogenetic analysis of single nucleotide polymorphisms in a target DNA, comprising the steps of:

(a) identifying a single nucleotide polymorphism of interest for diagnostic or pharmacogenetic analysis;

(b) conducting a primer extension reaction with components including (1) the target DNA, (2) labeled dideoxynucleotides, and (3) an oligonucleotide primer having a sequence hybridizable to the target DNA, so that a 3' end of the oligonucleotide primer terminates at a last nucleotide before a single nucleotide polymorphism, whereby an extended primer is produced including a 3' end having a labeled dideoxynucleotide corresponding to the single nucleotide polymorphism in the target DNA;

(c) hybridizing the extended primer to one or more oligonucleotides immobilized on a solid support in the form of an immobilization pattern, whereby a hybridization pattern is produced; and

(d) detecting the presence or absence of hybridized extended primer in the hybridization pattern.

28. An apparatus for analysis of single nucleotides polymorphisms in target DNA, comprising:

a multiprocedure station having a sealable interior able to hold one or more microarrays,

a source of one or more oligonucleotide primers to be added the to microarrays, the primers having labeled 3' ends corresponding to one or more single nucleotide polymorphisms, and

a heating or cooling unit arranged to heat and/or cool the microarrays.

29. The apparatus of claim 28, further comprising:

a washing assembly arranged to wash the microarrays, and

a drying assembly arranged to dry the microarrays.

30. The apparatus of claim 28, further comprising:

an automated pipetting robot including a xyz-robot arm, an active dispenser, and a wash station arranged to wash the active dispenser, the robot arranged to transfer said primers to said microarrays.